Monitoring the Distribution and Abundance of Steelhead in Upper Sacramento River Basin Tributaries

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Introduction

PSMFC and CDFW began implementing the Central Valley Steelhead Monitoring Program (CVSMP) in July 2015 to monitor Central Valley (CV) steelhead (*Oncorhynchus mykiss*) in the Sacramento River watershed. A component of that program includes monitoring steelhead distribution and abundance in the Upper Sacramento River Basin (USRB) tributaries.

Goals:
- Monitor adult abundance, distribution and run timing of Central Valley (CV) Steelhead in USRB tributaries
- Estimate juvenile abundance
- Estimate emigration timing of Juvenile CV Steelhead

Objectives include:
- Install PIT antenna arrays in tributaries of Upper Sacramento River to detect movement of tagged adults and juveniles (reference photo)
- Video, Didson, Aris, and Vaki monitoring to count steelhead migrating into USRB tributaries (Figure 1)
- Utilize rotary screw traps and their efficiency to implant PIT tags in juvenile Steelhead and evaluate trends in juvenile abundance

Methods

- Passive Integrated Transponder (PIT) tag interrogation arrays
  - Mark-recapture extension of Fyke Program
    - Supporting main-stem tagging efforts
  - Provide data on seasonal, temporal, and behavioral characteristics of hatchery and natural origin steelhead

- Video/SONAR monitoring of USRB tributaries
  - Video stations made-up of three underwater cameras, one overhead
  - Installed in twenty ft. opening in weir to direct migration within detection range
  - Resistance board weir self-adjusts in changing water conditions providing late season monitoring opportunities
  - Long and short-range SONAR used during high turbidity
  - Fish ladders ideal for Vaki placement; infrared sensors are limited in range to a few feet

- Rotary Screw Trapping
  - PIT-tag steelhead smolts
    - Weight, length, genetic sample
  - Trap efficiency study
    - Track changes in fish abundance
  - Mark-recapture
    - Juvenile outmigration timing

Resistance board weir installed on Clear Creek

Steelhead smolt caught in Deer Creek

Bear Creek PIT array

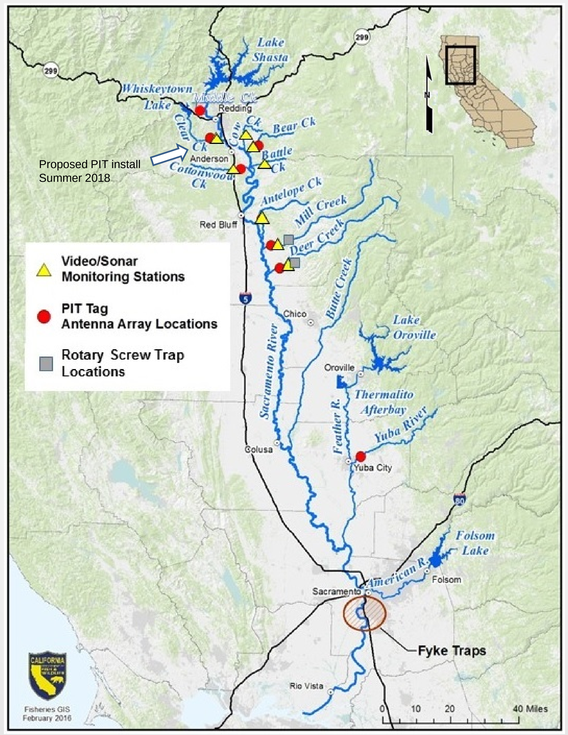
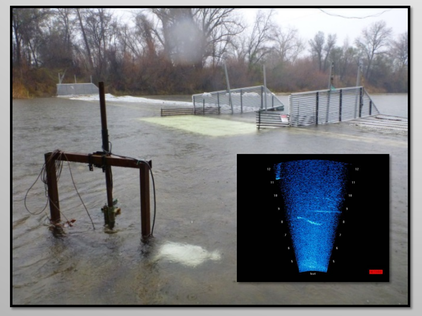
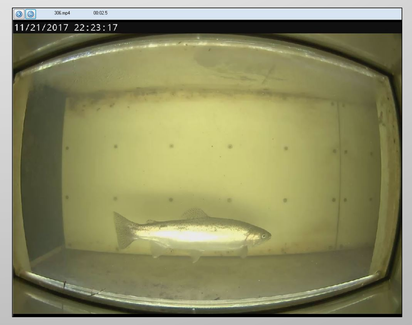


Figure 1. CVSMP monitoring sites in the Sacramento River and tributaries.

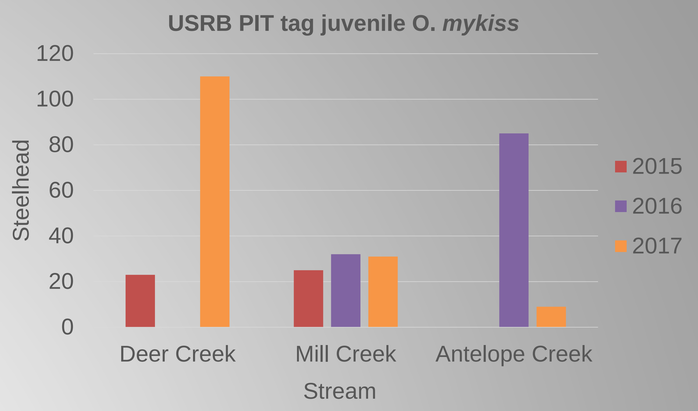


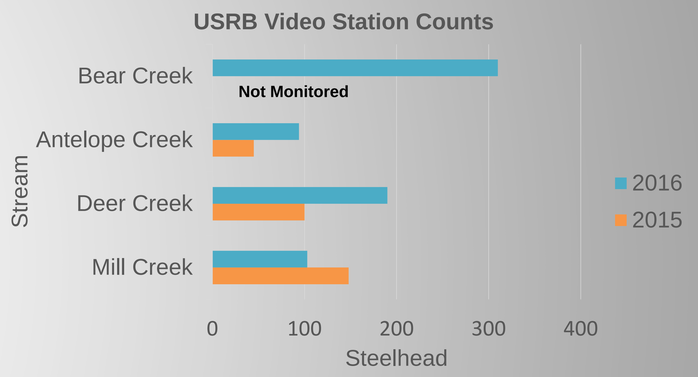
DIDSON monitoring on Clear Creak



VAKI monitoring on Antelope Creek

Results





Conclusions

- Resistance board weirs provide late season steelhead monitoring opportunities
- Rotary screw trapping has proven effective in capturing and tagging natural origin steelhead smolt on Deer and Mill Creeks

Future Goals
- Examine trends in steelhead abundance in the Central Valley
- Identify spatial distribution of steelhead to identify current range and observe changes
- Evaluate and enhance monitoring, research, and management goals and objectives
- Estimate steelhead population abundance
- Analyze collected tissue samples to determine anadromy
- Redd Surveys
  - Flexibility in changing conditions
  - Negligible impacts to sensitive species
  - escapement estimates

Future Infrastructure
- PIT Array
  - Clear Ck, Paynes Ck, Cow Ck, Battle Ck
- Resistance board weir
  - North and South fork Cottonwood Ck,
- Rotary screw trapping
  - Bear Ck, Antelope Ck, Cottonwood Ck, Clear Ck, Mainstem Sacramento, Cow Ck